GLOSSARY

RSSI – Received signal strength indicator (RSSI) is a measure of the power present in a received radio signal.

dBm – A unit of measure of the absolute radio power level in decibel scale vs 1mW of power. It means 1mW is 0 dBm, 10 mW is 3 dBm, 100 mW is 10 dBm, etc.

DCDC converter – An electronic circuit that provides an output regulated voltage that is different (higher / lower) than its input voltage. In a radio chip and battery-operated system, its purpose is to convert the battery voltage to a lower regulated level (also called a “buck converter”).

RF balun – This RF circuit filters RF signals (ensuring compliance with local radio regulations such as ETSI, FCC, and ARIB) and performs 50-Ohm adaptation with an antenna connector to ensure optimal RF transmission and reception performance.

PLL – Phase Lock Loop is a circuit that generates the required phase or frequency in a radio system. This is basis of the analog part of a radio transceiver to perform radio modulation & demodulation.

HS XtAL – High-speed crystal oscillator required to provide the reference frequency to the PLL in order to generate the correct RF frequency.

RO – A ring oscillator is an internal circuit (low-cost vs external 32 kHz crystal oscillator) that is required for low-power management of transceivers. Internal transceiver timers run based on the RO frequency.

PCB antenna – PCB antenna is designed on a printed circuit board using copper lines. Its advantage in terms of cost is that its one-quarter wavelength ensures good RF performance.

Transmitter – In RF applications, all measurements are based on 50-Ohm connectors to ensure a reference setup for radio & power consumption measurements. Moreover it saves radio designs with antennas which are close to 50-Ohm impedance.

Extended data packet length – Optional BLE 4.2 feature supported over BlueNRG-2 used to increase data transfer rate (up to 700 kbps).

Secure connection – Optional state-of-the-art BLE feature supported over BlueNRG-2 to improve connection security.

FOTA – Firmware (application & stack) Over-The-Air upgrade. The procedure allows to push new firmware on a device deployed in the field.

GATT – Generic Attribute Profile software layer (part of the BLE stack) that defines how attributes are organized and how the application can access them.

Advertising – Bluetooth devices send advertising packets (PDUs) to broadcast data, and to allow other devices (scanners) to find and connect to them. The advertising data consists of up to 31 bytes of user configurable data.

Scan resp – An additional 31 bytes can be sent as a scan response to a scan request (scan request sent from client device such as a smartphone).

Secure – A beacon device uses advertising mode to share data with users. The payload can be specified such as beacon (Apple) and Eddystone (Google) or can be configured by application.
SYSTEM ARCHITECTURE

ST’s BlueNRG portfolio offers various low-cost BLE solutions from the basic BlueNRG-MS network processor to complete BlueNRG SoC application processors as well as chipsets and modules. This reference guide aims to help developers understand which BlueNRG solution best addresses their needs and constraints.

The BlueNRG-MS network processor offers a BLE solution for embedded applications that do not require software development. The BLE stack is preloaded, and developers can concentrate on the user experience.

The BlueNRG-1 SoC is a complete BLE SoC solution that includes a 32-bit ARM Cortex-M0 processor, a Bluetooth Low Energy (BLE) controller, and other peripheral components. It is designed for applications that require higher performance and flexibility than the BlueNRG-MS.

The BlueNRG-2 SoC is a powerful BLE solution that includes a 32-bit ARM Cortex-M4 processor, a Bluetooth Low Energy (BLE) controller, and other peripheral components. It is designed for applications that require high performance and flexibility.

APPLICATION FEATURES

On top of basic beacon or point-to-point connections, BLE technology brings flexibility to enable multiple connection scenarios such as a smart hub connected to several sensors. ST solutions enable maintaining up to 8 connections at the same time, impacting available RAM resources.

To ensure secure product implementation, the firmware Over-The-Air (FOTA) capability is standard. This feature allows an efficient FOTA deployment, leading to memory and data rate constants.

With the number of connected devices increasing daily, securing the security of such devices is a very important concern. The Bluetooth Low Energy stack integrated over our latest BlueNRG SoC offers state-of-the-art communication, security, and privacy mechanisms.

APPLICATION ARCHITECTURE: POINT-TO-POINT BLE, BLE MESH, SIMPLE RADIO COMMUNICATION AT 2.4 GHz

In industrial applications, there is today a strong need to connect sensors and be able to monitor and control machines.Bluetooth Low Energy technology easily brings connectivity from an RF product to a user's smartphone with a low-power impact. This is possible thanks to specification and certification (IEEE 802.15.4, Zigbee, Zigbee Pro, Bluetooth Mesh 1.0 Certification), firmware and smartphone code libraries for easily deploying a Lightning application.

APPLICATION TOPOLOGIES: SOFTWARE ENABLERS

Bluetooth Low Energy Mesh

Bluetooth Mesh is a new topology available for Bluetooth Low Energy (BLE) devices that enables many-to-many communications. It is optimized for creating large-scale device networks, and is ideally suited for building automation solutions including lighting and sensor networks.

The STSW-BNRG-Mesh software package includes the ST BLE Mesh stack (ST SIG Mesh 1.1 Certification), firmware and smartphone code library for easily deploying a Lightning application.

APPLICATION TOPOLOGIES: SOFTWARE ENABLERS

Bluetooth Low Energy Radio

Bluetooth Low Energy technology brings flexibility to host different software enablers in order to address various application needs.

BlueNRG Software Development Kits offer flexibility to host different software enablers in order to address various application needs.

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BlueNRG 2.4GHz Radio driver

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